

Effect of Prolonged Use of Facemask on Ambulance Driver During Covid 19: A Questionnaires Study

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Abstract

Background: The nose is a complex organ that shapes and has many roles as an integral part of the face. The nose's primary purpose is to humidify, warm the inspired air, and also helps to remove the destructive particles from entering the lower respiratory tract. In general, an average adult inspires about 10,000 L of air each day. Nasal mucosa is a highly vascular structure and has a large surface area of 150 cm square. Physiologically, the nose has 50% resistance in the entire airway, which when affected plays a significant role in total respiratory function. that prolonged use of facemasks induces difficulty in breathing on exertion and excessive sweating around the mouth to the Ambulance driver which results in poorer adherence and increased risk of susceptibility to infection

Objectives: The aim of this study is to determine the effects of prolonged usage of N95 respirators and surgical facemasks on Ambulance driver

Material and Methods: A self constructed questionnaire containing 10 questions regarding the prolonged use of N95 respirators and surgical mask on Ambulance driver between the age group of 35 – 50 years were handed to them

Results: This study suggests that prolonged use of facemasks induces difficulty in breathing on exertion and excessive sweating around the mouth to the Ambulance driver which results in poorer adherence and increased risk of susceptibility to infection.

Keywords: N95 respirators, Surgical masks, COVID-19, Ambulance driver

Introduction

The nose is a complex organ that shapes and has many roles as an integral part of the face. The nose's primary purpose is to humidify, warm the inspired air, and also helps to remove the destructive particles from

entering the lower respiratory tract. It is the respiratory system's frontline defender.

Usually, an average adult inhales about 10,000 L of air per day. The nasal mucosa is a highly vascular system with a wide 150 cm square surface area. Physiologically, the nose has 50 percent resistance in the entire airway, which when compromised plays a major role in overall respiratory function. All of these parts contribute to normal body homeostasis. Individual respiratory safety devices and face masks are vital instruments to protect health care staff in hospitals and clinics and play a key

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role in reducing the spread of 2019's high-risk pandemic infection^{1,2,3}

Coronavirus disease (COVID-19) is caused by a newly identified coronavirus and is an infectious mild to moderate respiratory disease. In patients with other pathologies, this infection is a serious illness, especially in the elderly with underlying medical conditions such as chronic respiratory disease, cancer, cardiovascular disease, and diabetes. With a high mortality rate, these patients develop extreme acute pneumonia. The primary way in which the virus spreads is through saliva droplets, formed by an infected individual during coughs or sneezes or through discharge from the nose. Infectious diseases that can become major public health issues can be transmitted by airborne bacteria or viruses. If masks are not used properly, the use of protective face masks (PFMs) will not be successful. Because of airflow resistance and discomfort associated with facial heat build-up, particularly in hot and humid weather, many individuals use a PFM without complying with safety regulations.^{4,5}

The direct surgical mask has a low/moderate filter output with lower airflow resistance levels, while the high heat and humidity under a PFM may cause the PFM's outer surface to condense moisture, which therefore impairs the loss of respiratory heat and imposes an increased heat burden. It has been suggested that a rise in facial temperature may induce a panic disorder with hot flashes and sweating caused by elevated CO₂ levels under the PFM. In reality, a significant increase in skin temperature, especially under the mask, is created by wearing a surgical mask or respirator^{6,7,8}. A PFM causes a large increase in the effects of facial skin on thermoregulation. For this purpose, PFM is misused by several individuals without covering the nose or, after a few minutes, can lead to partial detection of the nasal region. Impatience with the thermal effects of PFM leads to discomfort and can simultaneously cause decreased usage and decreased consumer protection^{9,10}. Impatience with PFM's thermal effects leads to irritation and can cause decreased usage and reduced safety for the user at the same time. The aim of the present study was to evaluate facial skin temperature, discomfort and hands moving the mask with thermal Infrared Imaging while wearing surgical masks or N95 respirators.^{11,12}

Methodology

1) **Study design**- self constructed questionnaire

2) **Study set up**-Hospital Ambulance driver

3) **Selection criteria**-Ambulance driver who are willing to participate in the study

4) **Sample size**:30

Inclusion criteria-

Ambulance driver between the age group of 35-50 years

Exclusion criteria-

co-morbidities like diabetes, hypertension, epilepsy, cardiac illness, asthma & other respiratory illness

Materials used-structured questionnaire

Procedure-

Permission to carry out the research were taken from the ethical committee of the Datta Meghe college of Physiotherapy, Nagpur.

According to the inclusion criteria the Ambulance driver who were voluntarily willing to participate in the study were selected from various multispeciality hospital.

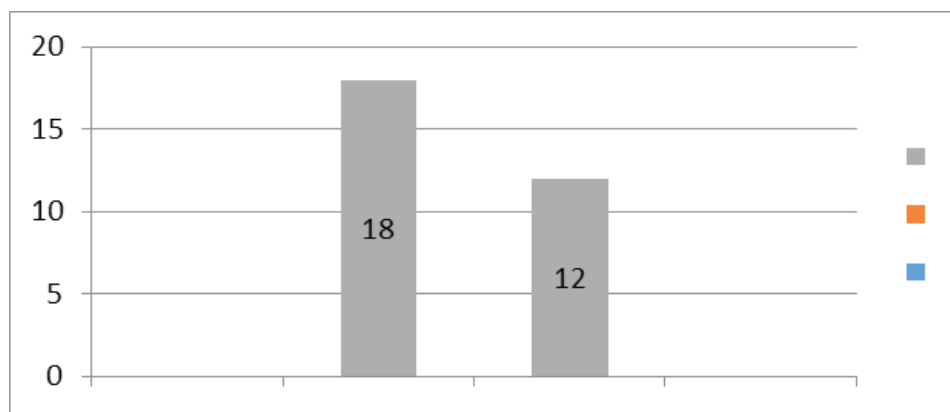
The aim and protocol of the study were described to the driver and their written consent were obtained. On the same day, the questionnaire were handed to the Ambulance driver by the therapist, and requested then to tick in the appropriate boxes of the questionnaire according to their most suitable answers.

A stipulated time of 10-15 minutes were given to them to fill the questionnaire and were asked to hand over the questionnaire to the therapist within the time limit.

The questionnaire was simple but even if the driver face any problem while filling the questionnaire, the therapist was explain it and solve the problem. The questions which were unticked and which contained any other marking other than tick, those questionnaire were not included for data analysis

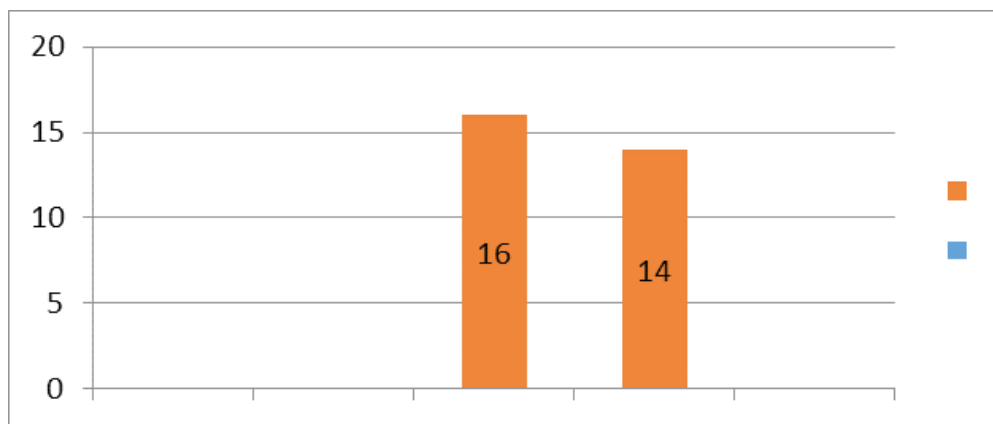
Results

QUE1:FEELING OF GENERALIZED NASAL DISCOMFORT



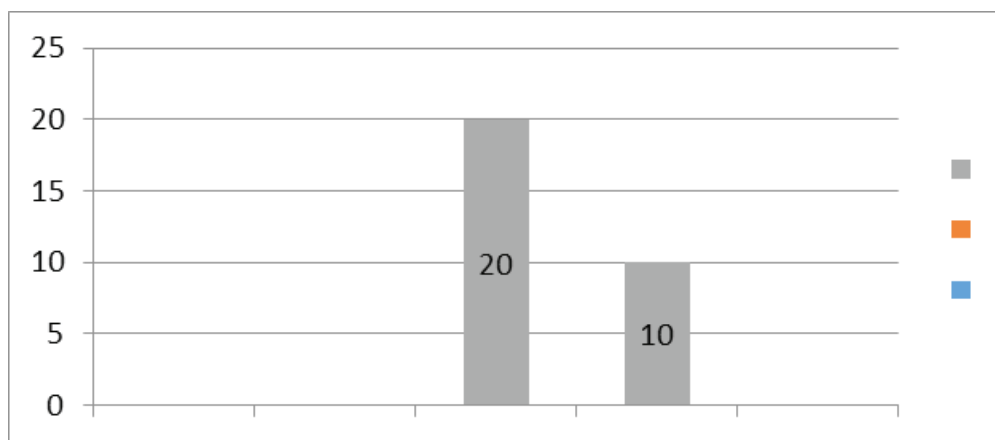
Graph 1 shows that 60% of the participants experienced of generalized nasal discomfort and 40% of the participants had not experienced

QUE2:FEELING OF HOT BURNING NOSE



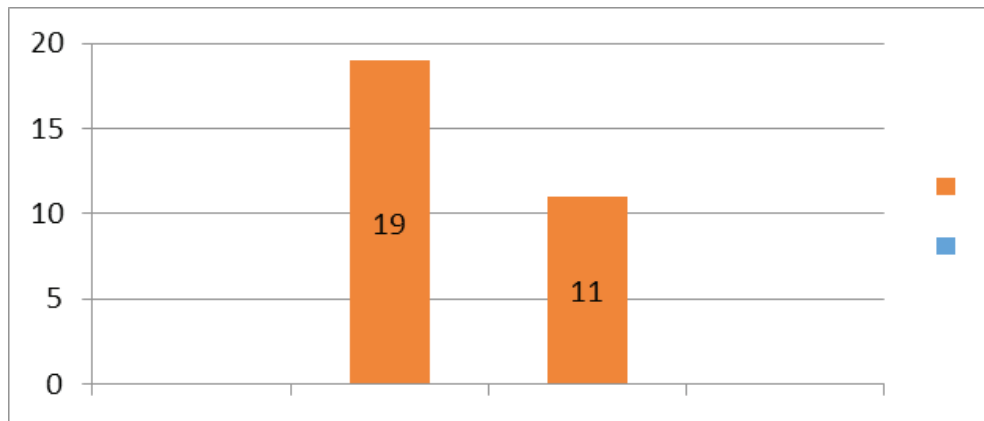
Graph 2 shows that 53.5% of the participants experienced hot burning nose whereas 47% of the participants had not experienced

QUE3:EXPERIENCE EXCESSIVE SWEATING AROUND MOUTH



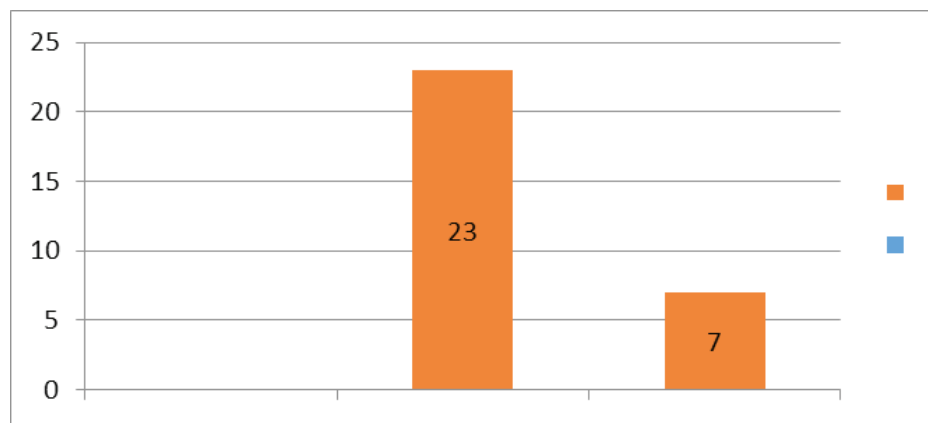
Graph 3 shows that 67% of the participants experienced excessive sweating around the mouth and 33.3% of the participants had not experienced

QUE4: EXPERIENCE PAIN BEHIND EAR



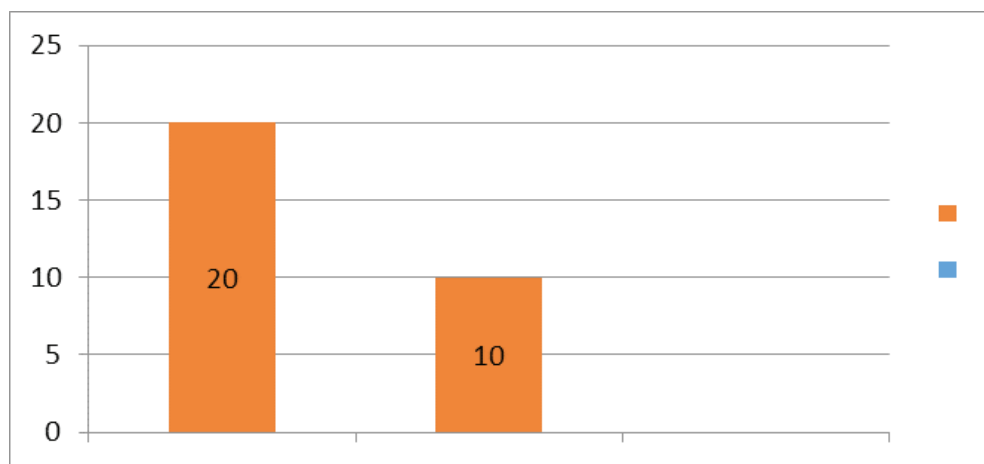
Graph 4 shows that 67% of the participants experienced pain behind the ear and 33% of the participants had not experienced

QUE5: EXPERIENCED TROUBLE BREATHING ON EXERTION



Graph 5 shows that 77% of the participants experienced trouble breathing on exertion whereas 23.3% of the participants had not experienced

QUE6: EXPERIENCED BAD BREATH



Graph 6 shows that 67% of the participants experienced bad breath whereas 33.3% of the participants had not experienced

DISCUSSION

The result of the present study shows that facemasks can lead to a wide spectrum of nasal discomfort and complaints pertaining to the facial skin and oral cavity due to its prolonged usage. There is a decrease in humidification of air beneath the facemask and decrease in transpiration of the skin around the nasal and perioral region^{13,14}. 60% of the participants had generalised nasal discomfort on wearing the facemask for a prolonged period of time. Wearing the facemask for a prolonged period causes reduced heat loss from the body by various mechanisms such as conduction, convection, evaporation and radiation¹⁵.

This is supported by **Antonio Scarano, Frances co Inchingolo** who compare the facial skin temperature & heat flow when wearing medical surgical masks to same factor when wearing N95 respirators, each subjects were invited to wear surgical mask on respirator for the infrared thermal evaluation was performed to measure the facial temperature of perioral region & perception ratings related to humidity, heat breathing difficulty & discomfort were recorded, he concluded that N95 respirators are able to induce an increased skin temperature, greater discomfort & lower wearing adherence when compared to medical surgical masks.¹⁵

67% of the participants experienced excessive sweating around the mouth and pain behind the ear. This is supported by **Y.Li,H.Tokura et al**, investigated the effect of wearing N95 & surgical facemask with and without nano-functional treatments on thermo physiological responses and subjective perception of discomfort, he concluded that 1) the subjects had significantly lower average heart rate when wearing nano-treated & untreated surgical facemasks than when wearing nano-treated and untreated N95 facemasks. 2) The outer surface temp of both surgical facemask was significantly higher than that of N95 facemasks. 3) But surgical facemask had significantly higher absolute humidity outside the surface than both N95 facemasks. 4) Both surgical facemasks were rated significantly lower for perception of humidity, heat, breath resistance & overall discomfort than both N95 facemask, there was significant differences in preferences between the nano-treated & untreated surgical facemask and between the surgical & N95 facemasks.¹⁶

83.3% of the participants experienced that the nose

is irritated and itchy, The most common adverse reaction reported to the N95 mask was acne, a hot and humid microclimate is created in regions of the face covered by the mask, which predisposes to a flare-up of acne. Secondly, occlusion of pilo sebaceous ducts due to local pressure on the skin from the close-fitting mask could result in a flare-up of acne. This study is supported by **Chris C,Anthony.T.J Goon et al**, presented the prevalence of adverse skin reactions to personal protective equipment against severe acute respiratory syndrome in Singapore, he concluded that those who use mask regularly reported acne 59.5%, facial itch (51.4%) and rash 35.8% from N95 mask, the use of PPE is associated with high rates of adverse skin reactions.¹⁶

Conclusion

This study concluded that, the use of facemask plays an important role in causing significant discomfort in all the Ambulance drive during its prolonged usage which can limit the efficient usage of facemask, leading to decreased protection. Therefore facemasks are essential to protect us from COVID-19.

Conflict of Interest: Nil

Source of Funding: Nil

Ethical Clearance: taken from institutional ethics committee

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